#### SOCIETAL LIFE CYCLE ASSESSMENT

# Introducing the UNEP/SETAC methodological sheets for subcategories of social LCA

Catherine Benoît-Norris • Gina Vickery-Niederman • Sonia Valdivia • Juliane Franze • Marzia Traverso • Andreas Ciroth • Bernard Mazijn

Received: 27 October 2010 / Accepted: 10 May 2011 / Published online: 31 May 2011 © Springer-Verlag 2011

#### Abstract

Purpose In May 2009, the Guidelines for Social Life Cycle Assessment of Products (the Guidelines) were launched at the occasion of the International Organization for Standardization (ISO) 26000 (Social Responsibility) meeting in Quebec City, Canada. Developed by a United Nations Environment Programme/Society of Environmental Toxi-

Responsible editor: Thomas Swarr

C. Benoît-Norris (

New Earth, Sustainability Consortium,
University of New Hampshire,
22 Trafton Street,
York, ME 03909, USA
e-mail: catherine.benoit@earthster.org

G. Vickery-Niederman Environmental Dynamics, University of Arkansas, Fayetteville, AR, USA

S. Valdivia Sustainable Consumption and Production Branch, UNEP DTIE, 15 rue de Milan, 75009 Paris, France

J. Franze GreenDeltaTC, Raumerstrasse 7, 10437 Berlin, Germany

M. Traverso · A. Ciroth Institute for Environmental Engineering, Technical University Berlin, Office Z 1, Str. des 17. Juni 135, 10623 Berlin, Germany

B. Mazijn Faculty of Political and Social Sciences, Ghent University, Universiteitstraat 8, 9000 Ghent, Belgium

cology and Chemistry ("UNEP/SETAC") Life Cycle Initiative project group on Social Life Cycle Assessment (S-LCA), the Guidelines provide a framework to assess social impacts across product life cycles. A year later, the Methodological Sheets for the Subcategories of Social LCA ("the Methodological Sheets") are being made available to support practitioners engaging in the field. The Methodological Sheets provide practical guidance for conducting S-LCA case studies by offering consistent, yet flexible assistance.

Aim and scope A Methodological Sheet was developed for each of the 31 subcategories of assessment outlined in the Guidelines. Each sheet includes a subcategory definition tailored to S-LCA, an explanation of how the subcategory relates to sustainable development, information on data assessment, including examples of inventory indicators, units of measurement, and data sources, along with a reference section that points the user to further information. The data assessment section is intended to provide adaptable guidance to LCA practitioners by offering examples and does not prescribe comprehensive procedures. The Methodological Sheets do not provide guidance on aggregating subcategory indicators or characterization models, nor do they discuss interpretation of results. The sheets are focused on the inventory analysis phase of S-LCA. This article will detail the development process of this unique resource, its content and future development, and how it compares to other types of documents, such as the GRI G3, ISO 26000 guidelines on Social Responsibility and the Global Social Compliance reference code.

Conclusions The Methodological Sheets support the framework of S-LCA offered in the UNEP/SETAC Guidelines. They provide consistent guidance to assist LCA practitioners in case studies. At the same time, they have been designed to encourage context-specific application. Content

of the Methodological Sheets will continue to evolve. Over time, and when relevant, characterization and interpretation models will be added to the Methodological Sheets. The Methodological Sheets are currently under public review and available on the Life Cycle Initiative website. A finalized version will be available in 2011, integrating comments from the review process.

**Keywords** Business · Methodological sheets · Methodology · Social impacts · Social life cycle assessment (S-LCA) · Social responsibility · Socio-economic · Stakeholders · Supply chain · Sustainability

# 1 Background

# 1.1 Goal of the methodological sheets

The UNEP/SETAC Methodological Sheets for Subcategories of Social LCA (the "Methodological Sheets") complement the UNEP/SETAC Life Cycle Initiative Guidelines for Social Life Cycle Assessment of Products (the "Guidelines"), published in 2009 (UNEP/SETAC 2009). The Guidelines aim to serve as an effective framework for the method of social life cycle assessment (S-LCA). They were developed through a consensus of international leaders in the field.

The Guidelines describe subcategories of assessment as the basis of S-LCA. Subcategories are socially significant themes or attributes classified according to stakeholder groups and/or impact categories. The use of subcategories also takes place in Environmental LCA. In Environmental LCA, impact categories are subdivided into subcategories when they are too heterogeneous to allow for scientifically valid aggregation (UNEP/SETAC 2009; Udo de Haes et al. 1999). A social LCA might organize subcategories according to both stakeholders and impact categories. For example, the subcategory working hours could be classified into the stakeholder category Workers and/or the impact area Working Conditions (UNEP/SETAC 2009).

To enhance the applicability of the Guidelines, authors and reviewers felt the need to describe specific assessment methods for each of the proposed subcategories. These documents, originally produced during the writing of the Guidelines, further developed into the Methodological Sheets.

The Methodological Sheets were developed as a public resource to guide the application of S-LCA. As such, the following more detailed goals were kept in mind:

- Avoid misunderstandings about subcategories and clarify their relation to stakeholder groups
- Provide a "measurement recipe" for each of the subcategories in the S-LCA framework, including

- examples of inventory indicators, units of measurement, and potential data sources for hotspot assessment, as outlined in the Guidelines
- Provide measurement sources and background information sources for baseline data that could be used in S-LCA
- Enhance the ease and the consistency of application across different case studies
- Provide a comprehensive open source resource for S-LCA

# 1.2 History of development

The Methodological Sheets supplement the UNEP/SETAC Guidelines for Social Life Cycle Assessment of Products. The Guidelines' history has been placed in context by Benoît et al. (2010). There it was stressed that development of the Guidelines was a 6-year process (2004–2009), guided by the UNEP/SETAC Life Cycle Initiative's Project Group on the Integration of Social Criteria into LCA. Developing a classification framework for social criteria (later named subcategories of assessment) was a complex process, as described below. The Methodological Sheets are organized according to one agreed-upon, stakeholder-based framework.

#### 1.2.1 Early stages of classifying social criteria

The first in-depth discussion of subcategories took place at a seminar organized in Brussels (10–11 November 2005). Overall, the Brussels meeting concluded that, "To promote the development and practical use of Social LCA the next important steps are ... to establish a generally accepted list of well defined [subcategories] structured after stakeholder groups and after generally accepted impact categories. The connection with indicators in the field of CSR (GRI, SA 8000, ILO, OECD Guidelines for Multinational Enterprises, etc.) should be emphasized" (Grießhammer et al. 2006). It is important to emphasize that the group of participating experts decided to explore two classification schemes for subcategories: stakeholder-based and impact category-based.

Early work on the stakeholder-based scheme started from the agreed-upon four main stakeholder categories: Workers, Local Community, Consumers, and Society (national and global). The stakeholder group Value Chain Actors was added in 2008 to capture the potential social impacts of the relationship between producers (buyers) and suppliers (vendors). Alternatively, classification according to impact categories considers aggregate social issues such as Human Rights, Working Conditions, Health and Safety, Cultural Heritage, Governance, and Socio-economic Repercussions. It is important to note that the two classification



schemes are considered complementary (UNEP/SETAC 2009; Benoît et al. 2010).

The stakeholder group categorization was deemed to provide a stronger basis to validate issues and themes that should be included, and not overlooked, during S-LCA. There are many references on the importance of stakeholder theory to social assessments and on the consistent treatment of stakeholder categories (Freeman 1984; Donaldson and Preston 1995; Remmen et al. 2007). The consensus is not as far ahead regarding the choice of a small set of social impact categories. Further, different fields present different frameworks for impact categories; for instance, the World Bank's Four Capital framework (World Bank 1997), The Quality of Life and Human Well-Being frameworks (for instance, Sen 1993 or Max-Neef 1992), the Social Impact Assessment literature (Burdge 2004), the Millennium Ecosystem Assessment framework (Millennium Ecosystem Assessment 2003), etc. Jørgensen offers a good synthesis of some of the different approaches used and described in the S-LCA literature (Jørgensen et al. 2007). Because the stakeholder category framework was further ahead than the impact category framework, in terms of consensus, it offered the necessary consistency for the development of the Methodological Sheets work and was implemented first as the backbone structure.

The impact category framework was considered along-side the stakeholder category framework, and within the impact category framework, another area of the debate centered on the use of midpoint or endpoint impact categories. Midpoints and endpoints exist at different points along a "social impact pathway" that begins with a social intervention and leads to different levels of impacts. In LCA, indicators can be defined at these different levels of impact. For example, a midpoint indicator, such as Job Creation, lies before the endpoint indicator, Changes in Health (Jørgensen et al. 2007). Although causal models have been developed for S-LCA, quantifying and modeling the social impact pathways to endpoints can be complex (Weidema 2006; UNEP/SETAC 2009).

In discussions following the Brussels meeting, the group of participating experts concluded that midpoint categories and stakeholder-based subcategories of assessment provide an acceptable framework for S-LCA and would provide the framework for the Methodological Sheets. The project group concluded that endpoint categories would be considered at a later date. The following statements, rephrased from the minutes of the 8th Project Group meeting (Montreal, 25 October 2007), provide a basis for this conclusion:

 For an [environmental] LCA, it took a long time before developments proposed methodologies on how to move towards "endpoints," and these methods are not yet agreed upon internationally

- Taking into account the balance between accuracy and uncertainty, even in an [environmental] LCA, experts seem to agree that "midpoints" are the best proxy
- Experts in [social] LCA are very much aware, when discussing "damages"/"impacts"/"areas of protection," of the role of stakeholders

#### 1.2.2 Development of the stakeholder-based framework

The next important phase in drafting the Methodological Sheets was the intensive work at the 10th Task Force meeting in Freiburg (2–5 June 2008). The working groups of experts were composed according to the different stakeholder categories. They were tasked to review the work and to double-check the work on indicators/subcategories with internationally recognized categorizations/standards (e.g., GRI, International Organization for Standardization (ISO) 26000, etc.). One of the objectives was to make sure any "hot" social topic would not be missed. Hot topics are themes that are most important to stakeholders and issues that have the strongest potential of impact (positive or negative).

In the months following the Freiburg meeting, a list of stakeholder groups and subcategories was finally agreed upon and "deemed to be the main group of categories potentially impacted by the life cycle of a product" (UNEP/SETAC 2009). It was recognized that "additional categories of stakeholders ... or further differentiations or subgroups can be added." Table 1 lists each subcategory according to stakeholder group.

# 1.2.3 Further considerations for classification according to impact categories

As mentioned, the use of impact categories to present S-LCA results was carefully considered during development of the Guidelines. Despite several attempts, the Project Group did not reach a consensus on a set of impact categories that should be used in S-LCA prior to the publication of the Guidelines. Still, conversations surrounding the use of impact-based classification schemes, and relatedly different impact assessment methods, are worth noting. The Guidelines present two alternative and complementary examples of impact categories (Type 1 and Type 2). Type 1 impact categories aggregate results in groups that are defined according to study context and stakeholder interest. Type 2 impact categories lie within a causal chain model and consist of midpoint and endpoint categories. Parent et al. (2010), in a follow-up article to the Guidelines, stress the difference between Type 1 and Type 2 impact assessment. Type 1 impact assessment relates social performance to internationally accepted standards, known as "Performance Reference Points." Type 1 charac-



Table 1 Stakeholder categories and subcategories

Categories	Subcategories
Stakeholder "worker"	Freedom of association and
	collective bargaining
	Child labor
	Fair salary
	Working hours
	Forced labor
	Equal opportunities/discrimination
	Health and safety
	Social benefits/social security
Stakeholder "consumer"	Health and safety
	Feedback mechanism
	Consumer privacy
	Transparency
	End of life responsibility
Stakeholder "local	Access to material resources
community"	Access to immaterial resources
	Delocalization and migration
	Cultural heritage
	Safe and healthy living conditions
	Respect of indigenous rights
	Community engagement
	Local employment
	Secure living conditions
	Public commitments to sustainability issues
	Contribution to economic development
Stakeholder "society"	Prevention and mitigation of armed conflicts
	Technology development
	Corruption
Stakeholder "value chain actors," not including consumers	Fair competition
	Promoting social responsibility
	Supplier relationships

terization models have been proposed but are not yet generally accepted by S-LCA practitioners (UNEP/SETAC 2009). On the other hand, Type 2 impact categories are defined using impact pathways, and impact assessment takes the form of causal modeling. While this type of characterization is generally accepted among LCA practitioners, more work is necessary to quantify and to model relevant social impact pathways (Weidema 2006).

In a recent paper, Jørgensen discusses the validity of Type 2 impact assessment in relation to S-LCA (Jørgensen et al. 2010). As an example, Jørgensen illustrates the challenges of constructing pathways between the indicators of child labor and social areas of protection (AoPs), such as Human Well-being. Valid impact pathways are crucial to

identifying whether the indicators employed "actually represent damage on or benefit to the AoP" (Jørgensen et al. 2010). Jorgensen stresses that "if companies or other decision makers were more interested in child labour by principle than by consequence, it would not merely be a question of choosing indicators but rather AoPs, since in this case, 'the incidence of child labour' would become an AoP of itself, making this whole discussion of consequence irrelevant" (Jørgensen et al. 2010). It leads him to propose that S-LCA, in this case, should be based on deontological ethics (rule-based) instead of the consequential ethics normally connected to the LCA methodologies. This finding is more in line with Type 1 impact assessment.

In the end, the Project Group did not reach consensus over the preferred approach. As discussed below, the inventory indicators included in the Methodological Sheets are not intended for use in one type of assessment versus another. At this point, the Methodological Sheets present examples of inventory indicators without suggesting characterization models. As more practical experience is gained with social Life Cycle Impact Assessment methods, incorporating different impact assessment methods is a future goal of the Methodological Sheets.

### 1.2.4 Publishing the Methodological Sheets

When the Guidelines were published, the drafts of six "front-running" methodological sheets were publicly available on the UNEP website of the Task Force. The completed set of 31 sheets currently appears on the UNEP website for consultation (http://lcinitiative.unep.fr/, May 2011). They have been revised several times to ensure consistency and reliability (e.g., reference updates) and to integrate comments from external review. The Methodological Sheets in their present form are not cast in stone. The sheets are intended to be modified based on growing experience in their application. This calls for a regular update and maintenance mechanism to be implemented for the sheets.

# 1.3 External review process

Following the review guidelines of the UNEP/SETAC Life Cycle Initiative, the Methodological Sheets went through an external review process after the finalization of the drafts. The external review launched consists of a threefold process:

- Invited consultation on first drafts. Consulted participants included the members of the International Life Cycle Board.
- An international public stakeholder consultation complements the invited consultation. A web-based process supports this phase: http://lcinitiative.unep.fr.



Three general questions have been raised to assess the scientific soundness and the applicability of the Methodological Sheets:

- Are the subcategory definitions proposed concisely presenting the main concepts and key elements to be monitored in each methodological sheet?
- Is there potential for improving the proposed subcategory definition?
- Are the examples of subcategory indicators and data sources helpful in understanding assessment of the subcategory?
- 3. As a next step, an international peer review will take place. Feedback will be compiled by the chair of the technical review committee of the UNEP/SETAC Life Cycle Initiative. The technical review committee chair will summarize recommendations to the authors and follow up with the authors on consideration of comments.

Few comments have been received during the initial phase of the review process (Summer 2010). The vast majority of the comments referred to a wish to involve colleagues from other areas and with different expertise (different from LCA) in the review. This likely reflects the difficulty in reviewing new and cross-cutting methodologies.

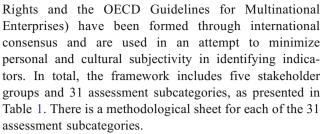
#### 2 The methodological sheets

# 2.1 Organization of the methodological sheets

According to the stakeholder theory, managers can improve performance by considering a wide range of stakeholders, beyond merely shareholders (Jones et al. 2002). In the Methodological Sheets, indicators and subcategories of assessment have been defined and classified according to the standpoints of these diverse stakeholders. This classification scheme is applied in S-LCA to ensure that the socioeconomic concerns of all impacted groups are taken into consideration.

In this framework, the stakeholders fall into five main groups, as mentioned above and defined by the UNEP/SETAC Guidelines: Workers, Local Community, Society (national and global), Consumers, and Value Chain Actors (UNEP/SETAC 2009). Each methodological sheet is categorized into one of these main stakeholder groups.

Within each stakeholder group, each sheet addresses a specific subcategory of assessment. As explained in the Guidelines, subcategories were defined according to international agreements and standards related to human rights, workers' rights, and other social issues. These agreements (e.g., the Universal Declaration of Human



Each methodological sheet contains three main sections: Definition, Policy Relevance, and Assessment of Data. These sections are discussed in detail below. Each sheet also contains a reference section that guides the reader to further information. In addition, an umbrella document has been developed to supplement the methodological sheets. It explains the general goal of the methodological sheets and how to interpret and use each section. Readers are encouraged to visit <a href="http://lcinitiative.unep.fr/">http://lcinitiative.unep.fr/</a> to view the methodological sheets as published for consultation.

#### 2.2 Subcategory definition

Each methodological sheet begins with the subcategory Definition. This section defines the social aspects that should be considered and assessed for each subcategory. This section aids LCA practitioners in establishing the scope of the assessment. In creating subcategory definitions, authors again consulted international agreements and standards to gain a sense of common definitions for each subcategory. These widely accepted definitions were made more relevant to S-LCA by elaborating on aspects that enterprises may control in their sustainability efforts (e.g., through management systems).

# 2.3 Policy relevance

The Policy Relevance section explains how the subcategory relates to sustainable development. This section begins by describing how the subcategory connects to potential positive or negative development outcomes and how management strategies may either encourage or discourage sustainable development (e.g., through community engagement initiatives or through misuse of local material resources, respectively.)

The section also lists international conventions, agreements, targets, and standards that relate to the subcategory. This literature is provided so that users can refer to internationally agreed upon norms for more information. LCA practitioners may consult these references to look for additional assessment aspects that may be appropriate on a context-specific basis. Sources range from general documents (e.g., the Universal Declaration of Human Rights) to references that are targeted to particular subcategories (e.g., the ILO Prevention of Major Industrial Accidents Convention



is a targeted reference for the Safe and Healthy Living Conditions subcategory).

International targets and standards cover principles, guidelines, goals, and performance standards that relate to the subcategory. In addition to agreed upon norms, these sources often contain information that may be translated into S-LCA metrics and are therefore useful to S-LCA practitioners. For example, sustainability reporting frameworks, such as the Global Reporting Initiative, and social responsibility guidelines, such as ISO 26000, often request specific information related to potential subcategory metrics. At times, this information is publicly available for specific organizations.

#### 2.4 Assessment of data

The Assessment of Data section describes types of assessment data and provides data sources for each subcategory. The goal of this section is to assist practitioners in compiling S-LCA inventories. It is divided into four parts.

The first part describes the different types of social data that may be used to assess the subcategory. In contrast to E-LCA, which relies upon quantifiable data, S-LCA often includes qualitative and semi-quantitative data. Qualitative data include narrative descriptions, while semi-quantitative data are typically yes/no responses or rating scale responses. Examples of each data type are provided for the subcategory. The use of non-quantitative data in S-LCA does not necessarily lead to issues compiling the S-LCA data inventory, but it does complicate the impact assessment phase due to difficulties aggregating qualitative information. Note that in many cases, particularly with social issues, qualitative descriptions of indicators are more meaningful than quantitative data or yes/no responses. For example, a low number of worker accidents may not indicate a safe working environment if accidents are underreported. In this case, a qualitative review of safety guidelines and their implementation may be preferred (Jørgensen et al. 2007).

The second part lists actual data sources to support S-LCA practitioners in conducting assessments. This section describes where inventory data for each subcategory can be found for both generic and site-specific assessments. Generic data are typically country-level or sector-level data used in S-LCA to screen for high-risk regions or hotspots. Government data and data from intergovernmental and non-governmental organizations are common sources for generic data. Site-specific data are generally obtained through interviews or organization-specific reports and audits. Types of site-specific data sources applicable to each subcategory are provided. Examples include interviews with workers,

trade union associations or human resources officers, and enterprise-specific documents, such as GRI reports.

Subsequently, concrete inventory indicators are provided in a table, including units of measurement and specific data sources. This section gives S-LCA practitioners an idea of how one might create a S-LCA inventory. Separate indicator tables are provided for generic and site-specific analysis. Table 2 is an excerpt from the methodological sheet for the subcategory Local Employment in the Local Community stakeholder group. It shows the generic and site-specific indicator tables for this subcategory. It is important to note that these tables list only examples of indicators and data sources; they do not provide an exhaustive list of indicators and are not intended to be complete.

Note also that generic analysis is a screening device. It allows the user to get a general feel for areas of social concern in certain countries and/or sectors. Generic analysis may be used to assess the performance of the company in relation to general external circumstances, but not to target blame on a particular company for country-level issues, such as underdeveloped infrastructure, high unemployment, or widespread crime. It is important to note, however, that a company can improve country-level social well-being through sustainable management strategies.

The last section defines limitations of the subcategories. Limitations often relate to data availability or data bias. For example, most social data are reported on a volunteer basis, and organizations may be hesitant to reveal social data due to reputational risk. Subcategories for which this is a major concern have been noted in the Methodological Sheets.

2.5 Comparison of the methodological sheets with other resources

# 2.5.1 The global reporting initiative's G3 guidelines

The Global Reporting Initiative's Sustainability Reporting Guidelines (the "G3 Guidelines") outline a voluntary framework for annual sustainability reporting that it is applicable to all types of organizations (www.globalreporting.org). The G3 Guidelines offer a consistent basis for organizational reporting on strategy, management techniques, and performance indicators. The focus of the G3 Guidelines is thus on a particular organization, rather than on the life cycle of a product.

The performance indicators of the G3 Guidelines are grouped into social, economic, and environmental categories. The social performance indicators are divided into four main groups: Labor Practices and Decent Work, Human Rights, Society, and Product Responsibility. Each group contains several sub-elements (e.g., employment, non-discrimination, anti-competitive behavior, customer privacy). While the



Table 2 Examples of indicator table for generic and site-specific assessment of the subcategory local employment

Inventory indicator	Unit of measurement	Data available
Generic analysis (hotspots)		
Unemployment statistics by country	Quantitative	ILO data on unemployment http://www.ilo.org/empelm/what/lang-en/WCMS_114240
Poverty and working poverty by country	Quantitative	ILO data on unemployment http://www.ilo.org/empelm/what/lang-en/WCMS_114240
Presence of local supply networks	Semi-quantitative	World Economic Forum rankings of supplier quantity, by country http://www.weforum.org/en/initiatives/gcp/Global%20Competitiveness%20Report/index.htm
Specific analysis		
Percentage of workforce hired locally	Quantitative	Interviews with management
		Review of organization-specific reports, such as GRI or COP reports
Strength of policies on local hiring preferences	Qualitative/semi- quantitative	Interviews with community members, employees, governmental agencies, management and NGOs
		Review of organization-specific reports, such as GRI or COP reports
Percentage of spending on locally based suppliers	Quantitative	Interviews with management
		Review of organization-specific reports, such as GRI or COP reports

Methodological Sheets cover many of the same subcategories, the classification framework of the Methodological Sheets is stakeholder-based. This makes it possible for S-LCA to highlight the performance of different stakeholder groups. For example, the Methodological Sheets treat Value Chain Actors as one assessment group, and presenting results for Value Chain Actors is useful given the importance of supplier relations to S-LCA. In Global Reporting Initiative ("GRI") reporting, supply chain assessment has been a relatively minor aspect, centered on the brand owner/end producer, but there is ongoing work by GRI to render more explicit supply chain reporting in its framework. In draft revisions related to Community, Human Rights, and Gender issues, performance indicators have been suggested that help identify impacts at different life cycle stages of a product. In addition, GRI is convening a working group that will focus on how to integrate supply chain considerations into the reporting guidelines.

Even in the G3 Guidelines' current form, individual performance indicators are particularly useful to S-LCA because these indicators request specific quantitative data and management-related qualitative data for a wide range of issues. G3 performance indicators provide the basis for a number of inventory indicators suggested in the Methodological Sheets. Since the G3 Guidelines are directed towards organizations, they are most applicable to enterprise-specific S-LCA, as opposed to generic (hotspot) assessment. In addition, sustainability reports that adhere to the G3 Guidelines provide an important source of public, enterprise-specific information, and G3 reports are often recommended as specific data sources in indicator tables of the Methodological Sheets. In summary, the Methodological Sheets offer a stakeholder-

based LCA framework for many of the G3 Guidelines' performance indicators. The Methodological Sheets consider additional social indicators from a wide range of generic and site-specific data sources.

#### 2.5.2 ISO 26000 (Social Responsibility)

ISO has recently developed voluntary guidelines on social responsibility for use by all types of organizations (www.iso.org). This standard (ISO 26000) was developed through an international consensus of many stakeholder groups. ISO 26000 includes valuable discussion on the general characteristics of social responsibility (e.g., transparency, respect for human rights, respect for stakeholder interests). Again, the emphasis is on the organization, rather than the product supply chain. The Methodological Sheets include similar information but place it into a S-LCA framework.

An important aspect that both resources contain is discussion of management practices that foster or deter sustainable development. ISO 26000 includes the section "Guidance on integrating social responsibility throughout an organization," from which inventory indicators related to management practices can be constructed. Similarly, the ISO 26000 section "Guidance on social responsibility core subjects" provides an important basis for indicator construction. ISO 26000 core subjects are Organizational Governance, Human Rights, Labor Practices, The Environment, Fair Operating Practices, Consumer Issues, and Community Involvement and Development. Organizational Governance is an over-arching subject that allows organizations to successfully manage other core subjects.



Aside from Organizational Governance, core subjects are broken down into sub-issues. ISO 26000 provides "Related actions and expectations" for each of these issues that pertain to organizational management. This section is yet another valuable resource when developing S-LCA indicators. ISO 26000, therefore, contains a wide range of background information on social responsibility that is useful for constructing enterprise-specific inventory indicators. The Methodological Sheets place this information into a stakeholder-based life cycle assessment framework.

#### 2.5.3 Global social compliance programme

The Global Social Compliance Programme (GSCP) is an initiative of the Consumer Goods Forum (www.ciesnet.com). It aims to address the problems of audit fatigue and duplication, audit quality, and unmet expectations in improving social impacts. It fosters greater standardization of methods and tools by bringing together main corporate members and brand holders and putting them up to the task of developing the programme. Even though it is less multistakeholder-oriented than ISO 26000 and GRI, the GSCP has delivered a wealth of useful tools for auditing in supply chains, including supplier self-assessment, pre-audit questionnaires, and management system tools. All of these are of keen interest to S-LCA practitioners. Because social performance information will need to be audited to hold validity in the eyes of the S-LCA peer reviewer, the GSCP has potential to play an important role.

The Methodological Sheets include certain inventory indicators from the GSCP supplier self-assessment questionnaire. While the GSCP is an important resource, it is more limited than the Methodological Sheets. The GSCP set of tools does not cover positive impacts, which are as important to S-LCA as negative impacts. In addition, while the GSCP focuses on the stakeholder group Workers, and somewhat Value Chain Actors, it does not address the Local Community, Society, and Consumer stakeholder groups.

# 3 Future needs

#### 3.1 Continual improvement

The sheets will need to be revised based on broader experience gained in new case studies, new knowledge in the LCA community from new and changing data sources, and as new S-LCA applications emerge. For example, in environmental LCA, environmental product declarations and labeling have become important applications beyond more traditional product comparisons. A similar development is quite possible for S-LCA.

To incorporate case study experience and methodological developments, a collaborative maintenance and update "structure" is under development for the Methodological Sheets. This will allow increasing S-LCA experience and knowledge to enhance the usability of the sheets as methods evolve.

#### 3.2 Characterization models

While the Methodological Sheets cover indicators and measurement guidelines for each subcategory, they do not provide a method or guidance on how to aggregate indicators within the same subcategory. In LCA, this is the task of characterization models. Characterization models allow for the description of subcategory results in aggregate, providing meaning to inventory indicator results. These results may then be used to draw conclusions or interpret results of the overall assessment.

As mentioned in Section 1.2.3, Type 1 and Type 2 impact categories are associated with different social Life Cycle Impact Assessment (sLCIA) methods. Type 1 sLCIA is a weighted aggregation into groups of contextual interest. Type 2 sLCIA aggregation is achieved using a causal chain model. Because consensus on the preferred method was not reached during development of the Guidelines, and the two types of impact assessment methods take different methodological paths, the sheets did not include further direction regarding the impact assessment and interpretation phase.

A few models for characterization and interpretation have been developed for Type 1 sLCIA. For instance, Ciroth and Franze (2009, 2011), Dreyer et al. (2010a, b), and Benoît, Aulisio, and Norris are authors of characterization models. Ciroth and Franze have applied their model in two case studies, on roses and a laptop notebook (Ciroth and Franze 2009). The model summarizes the indicators in a table, applying an easy to interpret color scheme. The color scheme describes the impact of enterprise behavior using a negative to positive rating scale. Dreyer et al. have developed a characterization system and models for the fundamental workers' rights from risk assessment to sitespecific analysis (Dreyer et al. 2010a, b), and Benoît, Aulisio and Norris have developed several characterization models for social hotspots assessment on a comprehensive set of issues (www.socialhotspot.org). Each of the method provides a model that is suitable for the interpretation of S-LCA indicators, but they are certainly not the only possible approaches. Hunkeler, Weidema, and Jørgensen have presented models for Type 2 sLCIA. In this rapidly growing field, more experience will be gained with characterization and interpretation models in the short term. Making them available in a transparent, easy to apply form is a clear future goal for the Methodological Sheets.



#### 4 Conclusions

The UNEP/SETAC Methodological Sheets for Subcategories of Social LCA have been developed as a complement to The Guidelines for Social Life Cycle Assessment of Products. They are intended to assist LCA practitioners in applying the S-LCA framework described in the Guidelines. They provide clear and practical measurement guidance for each assessment subcategory by offering examples of inventory indicators, units of measurement, and data sources. Use of the Methodological Sheets will enhance the consistency of S-LCA application across case studies.

While consistency allows for ease of application, due to the novelty of S-LCA, much room has been left for contextspecific application. The sheets suggest a range of references for further information on each subcategory, from international agreements to sustainability reporting guidelines, audit procedures, and targeted website information. This encourages LCA practitioners to be flexible as they implement evolving S-LCA procedures. Indeed, the sheets themselves are intended to be flexible, suggesting examples of indicators, rather than prescribing procedures. Content of the Methodological Sheets will continue to evolve and improve as more experience is gained in this field. In addition, methodological advancement related to characterization models will be an important future addition to the Methodological Sheets. Work has begun to develop a collaborative update system for the sheets so that LCA practitioners and other stakeholders can continue to engage in this process.

Acknowledgments The completed set of methodological sheets is an achievement that would not have been possible without the vision of Bernard Mazijn; the early work of Catherine Benoît, Julie Hébert, and Sophie Spillemaeckers; the guidance, support, and determination of Sonia Valdivia; the hard work and dynamism of Andreas Manhart, Siddhart Prakash, Asa Moberg, Cassia Ugaya, Julie Parent, and Carmela Cucuzella; the reflectivity of Bo Weidema, Greg Norris, and Andreas Ciroth; the participation of Ulrike Bos, Tabea Beck, Leif Barthel, and Pierre Mazeau; and finally, the commitment and exceptional work of Gina Vickery, Marzia Traverso, Juliane Franze, and Catherine Benoît. The work has also been strongly supported by the contribution of all the members of the Social LCA project group over the years and especially, Andrée-Lise Méthot, former co-chair, Jean-Pierre Revéret, and Véronique Jampierre.

#### References

Benoît C, Norris G, Valdivia S, Ciroth A et al (2010) The guidelines for social life cycle assessment of products: just in time! Int J Life Cycle Assess 15:156–163

- Burdge R (2004) The concepts, process and methods of SIA. The Social Ecology Press, Middleton, WI
- Ciroth A, Franze J (2009) Social life cycle assessment of roses—a comparison of cut roses from Ecuador and the Netherlands. Life Cycle Assessment Conference Boston IX, September 29—October 2, Boston
- Ciroth A, Franze J (2011) LCA of an ecolabeled notebook: consideration of social and environmental impacts along the entire life cycle. GreenDeltaTC GmbH, Berlin
- Donaldson T, Preston L (1995) The stakeholder theory of the corporation: concepts, evidence, and implications. Acad Manag Rev 20(1):65–91
- Dreyer LC, Hauschild M, Schierbeck J (2010a) Characterisation of social impacts in LCA part 1: development of indicators for labour rights. Int J Life Cycle Assess 15:247–259
- Dreyer LC, Hauschild M, Schierbeck J (2010b) Characterisation of social impacts in LCA part 2: implementation in six company case studies. Int J Life Cycle Assess 15:385–402
- Freeman R (1984) Strategic management: a stakeholder approach. Pitman, Boston, MA
- Grießhammer R, Benoît C, Dreyer LC et al (2006) Feasibility study: integration of social aspects into LCA. Oko-Institut, Freiburg
- Jones T, Wicks A, Freeman RE (2002) Stakeholder theory: the state of the art. In: Bowie N (ed) The Blackwell Guide to business ethics. Blackwell Publishing, U.K., pp 19–37
- Jørgensen A, Le Bocq A, Nazarkina L, Hauschild M (2007) Methodologies for social life cycle assessment. Int J Life Cycle Assess 13(2):96–103
- Jørgensen A, Lai L, Hauschild M (2010) Assessing the validity of impact pathways for child labour and well-being in social life cycle assessment. Int J Life Cycle Assess 15:5–16
- Max-Neef M (1992) Development and human needs. In: Ekins P, Max-Neef M (eds) Real-life economics: understanding wealth creation. Routledge, New York
- Millenium Ecosystem Assessment (2003) Ecosystems and human well-being: a framework for assessment. Island Press, Washington DC, USA
- Parent J, Cucuzzella C, Revéret J-P (2010) Impact assessment in SLCA: sorting the sLCIA methods according to their outcomes. Int J Life Cycle Assess 15:164–171
- Remmen A, Jensen A, Frydendal J (2007) Life cycle management: a business guide to sustainability. United Nations Environment Programme
- Sen A (1993) Capability and well-being. In: Nussbaum (ed) The quality of life. Oxford scholarship online monographs, Oxford, pp 30–54
- Udo de Haes H, Jolliet O, Finnveden G, Hauschild M, Krewitt W, Müller-Wenk R (1999) Best available practice regarding impact categories and category indicators in life cycle impact assessment. Int J Life Cycle Assess 4(2):66-74
- UNEP/SETAC (2009) Guidelines for social life cycle assessment of products. United Nations Environment Programme, Paris
- Weidema BP (2006) Social impact categories, indicators, characterisation and damage modelling. Presentation for the 29th Swiss LCA Discussion Forum
- World Bank (1997) Expanding the measures of wealth: indicators of environmentally sustainable development. Environmentally sustainable development studies and monographs series no. 17. The World Bank, Washington, USA

